



## **APS Reader for ArcGIS 10.3 User's Manual**

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**ARIS B.V.**  
**<http://www.aris.nl/>**

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## 1. Introduction

The APS Reader for ArcGIS makes it possible to view and use files in the APS format in ArcCatalog and ArcMap without having to convert those files.

Spatial models which have been written outside of standard GIS applications (i.e. written in C/C++ or Fortran), sometimes use the APS Grid format for storing intermediate and / or final results. In order to view this data in ArcMap, it is necessary to perform a conversion from APS to a format supported by ArcGIS, such as the ESRI GRID. This ESRI GRID can then be viewed in ArcMap.

Using the APS Reader, it becomes possible to preview APS rasters (output from the OPS model) directly and without conversion in ArcCatalog, and to add them to ArcMap. All the default raster operations in ArcMap (for example the Raster Calculator) can be applied to the APS Grid.

Floating-point and integer type APS Grids are recognized automatically. An important difference between floating-point and integer type rasters is that a Unique Value Classification is available only for integer rasters.

The APS Reader is implemented as a DLL which, once placed in the correct ArcGIS directory, is used to identify files in the APS format.

APS Reader version 1.0 can be used with ArcGIS versions 8.0 to 9.3.

APS Reader version 2.0 can be used with ArcGIS version 10.0.

APS Reader version 2.1 can be used with ArcGIS version 10.1.

APS Reader version 2.2 can be used with ArcGIS version 10.1 and 10.2.

APS Reader version 2.2.1 can be used with ArcGIS version 10.1, 10.2, 10.2.1 and 10.2.2

APS Reader version 2.3 can be used with ArcGIS version 10.3 and 10.3.1

## 2. Installation

### 2.1 Basic installation

Installation of the APS Reader is very straightforward:

Run the automatic setup (apsreader.exe) as administrator user. The setup procedure checks whether ArcGIS version 10.3.x is installed and determines the installation folder. Any necessary changes in configuration files for ArcGIS are carried out automatically. After the setup is completed the user can start ArcGIS and files with file extensions ".aps", ".plt" and ".grd" are recognised and shown by ArcGIS as APS raster grids.

### 2.2 Configuration

For advanced users it is possible to enable or disable one ore more file extensions. Open the menu "ArcCatalog Options" or "ArcMap Options" and tab "Raster". Click the button "File Formats" and check or uncheck the specific file extension (You will need to restart ArcCatalog or ArcMap to make the change effective):

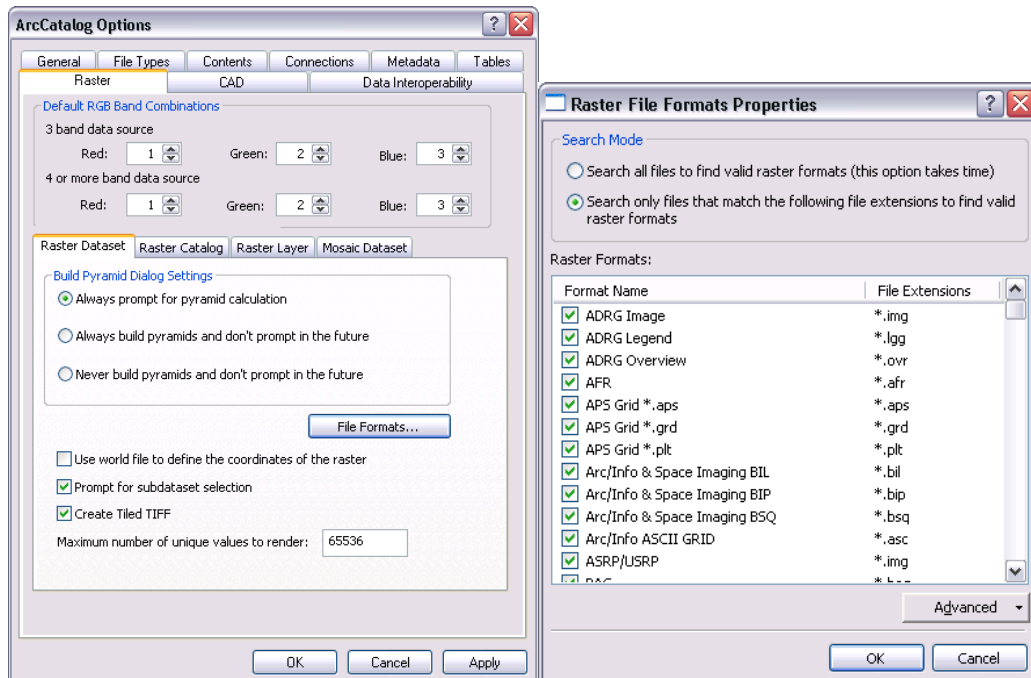


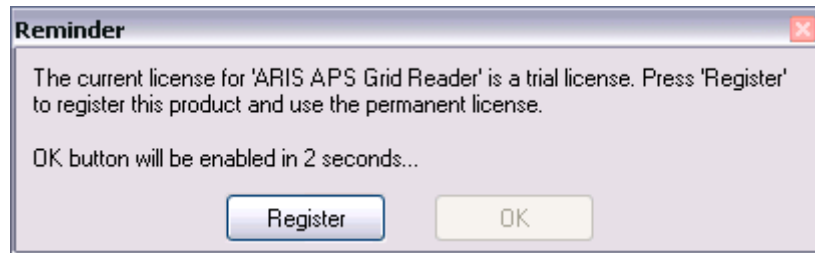
Figure 2-1. Custom settings to enable or disable Raster File Formats and/or File Extensions

Configuration of the Raster File Formats and/or File Extensions can be useful to disable conflicting file formats.

### 3. Registration

#### 3.1 Trial license

The distributed version of the APS Reader is a fully functional version, except that there is a reminder message shown, almost each time you open an APS Grid file or when ArcGIS is requesting information from the APS Reader. For this reason you might see many reminder screens, especially when browsing a directory with many APS Grids (only in trial license mode).



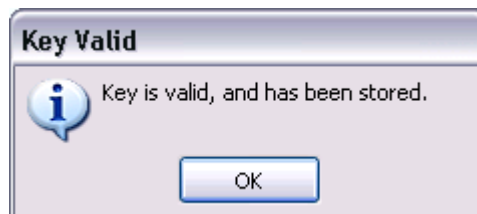
#### 3.2 Register

Pressing the *Buy Now!* button will take you to our online store, where you can order this product. Note that you will need the hardware fingerprint of the computer where you want to install the tool, shown in the dialog below (appears when you press *Enter Key*). After you complete your purchase, a personal registration key will be sent to you by email. Please store this key in a safe place.

Pressing the *Enter Key* button will present you with the following dialog, where you must enter your name and the registration key.



Once you have entered a valid registration key, press *OK*. This key will be stored on your PC.



If you have the ARIS License Checker installed, the registration forms are also accessible through the ARIS License Checker. The ARIS License Checker is available without cost from <http://www.aris.nl/download>.

The ARIS License Checker is also a better alternative for registration if you still get reminder messages after successful registration.

### **3.3 Update license**

When your license is not valid anymore through changes on your PC, you can obtain a new license (fair use policy) after you unregister the license using the ARIS License Checker. The ARIS License Checker is available without cost from <http://www.aris.nl/download>.

Send an e-mail to [helpdesk@aris.nl](mailto:helpdesk@aris.nl) with:

- ARIS product name and version
- original hardware fingerprint (active license, if available)
- registration name (active license)
- license key (active license)
- confirmation code (from unregister)
- new hardware fingerprint (from register)

If you are entitled to receive a new license key, a new key will be sent to you by e-mail as soon as possible (same day, but might also take some days as this is not an automated process).

## 4. Using APS files

After the setup procedure has finished, APS files can be used in ArcMap and ArcCatalog through standard ArcGIS functions (which use the APS reader software).

### 4.1 ArcMap

APS files can be used in ArcMap: Use the *Add Data* button (📁) or drag from the Catalog Window (ArcGIS 10) to add an APS raster to the map:

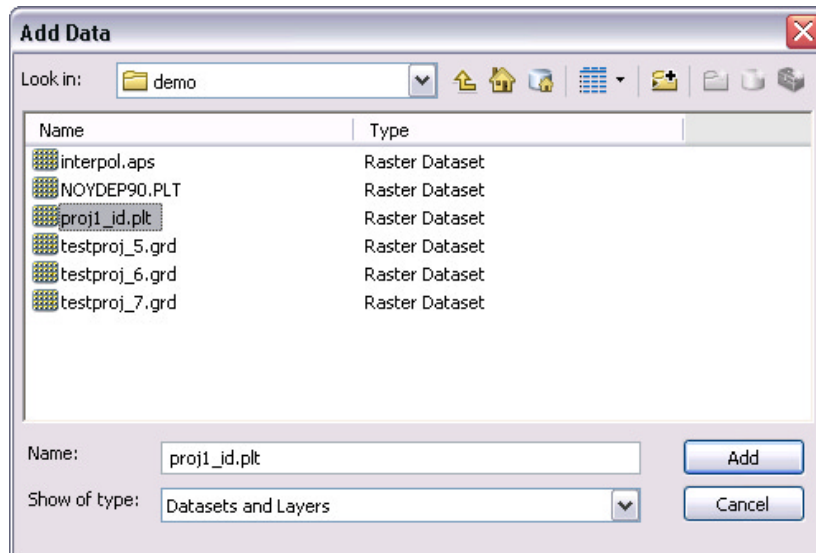


Figure 4-1. Add an APS file (Raster Dataset)

If the APS file (Raster Dataset) contains more than one layer, the first three layers will be added as RGB bands in the ArcMap view (Figure 4.3). If the APS file contains one layer the layer will be added as a grid to ArcMap (Figure 4.4).

To add an individual layer from an APS file, double click on the raster symbol (📁) next to the filename, and after selecting a layer, press *Add*:

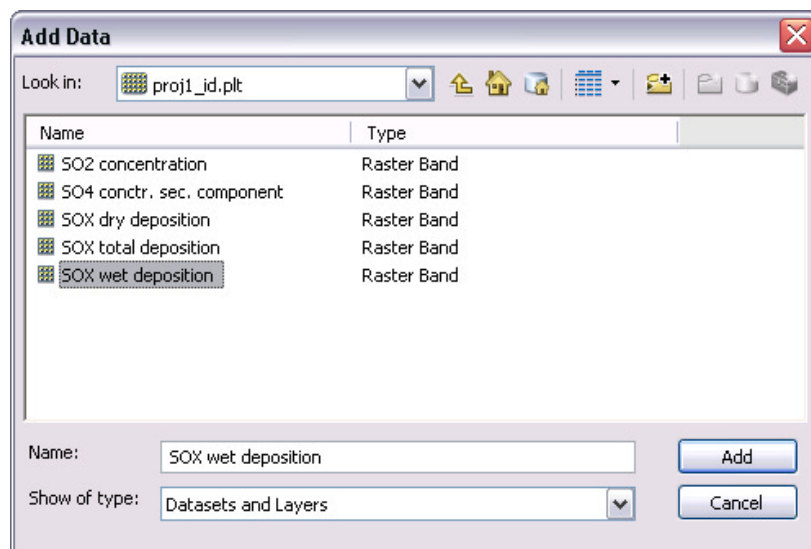


Figure 4-2. Add one layer (Raster Band) from an APS grid

**Note:** Only APS files that have a file extension \*.APS, \*.GRD or \*.PLT can be used. Other file extensions will be ignored.

Likewise, all standard functions, such as the *Raster Calculator* and other *Spatial Analyst functions* are available. The layer can also be used in a Layout for creating maps.

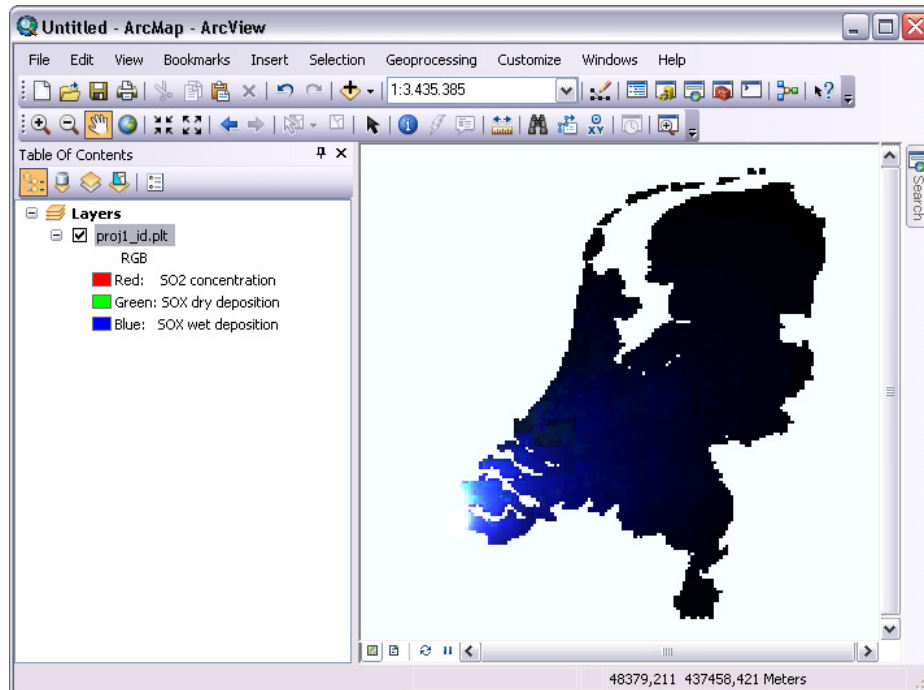


Figure 4-3. APS file with more than one layer in ArcMap shown as RGB bands

The view with RGB bands is not really functional, but is implemented to have result instead of giving an error message. The first three layers in an APS file are returned to be the RGB bands.

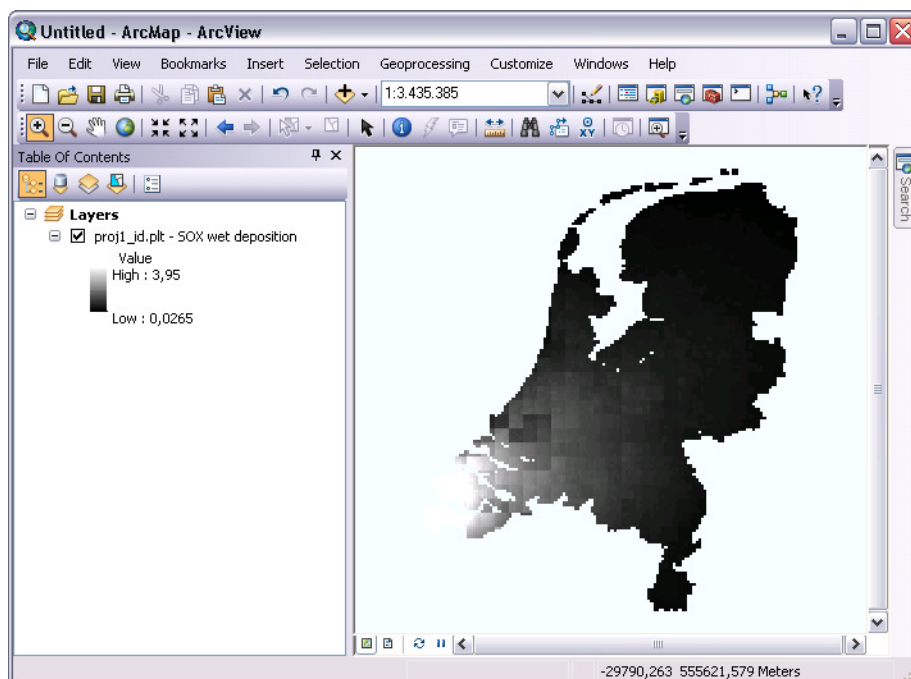


Figure 4-4. One layer from APS file stretched between low and high value



## 4.2 ArcCatalog

In ArcCatalog APS files can be browsed and give the same preview of the file in RGB bands or stretched between low and high value as in ArcMap.

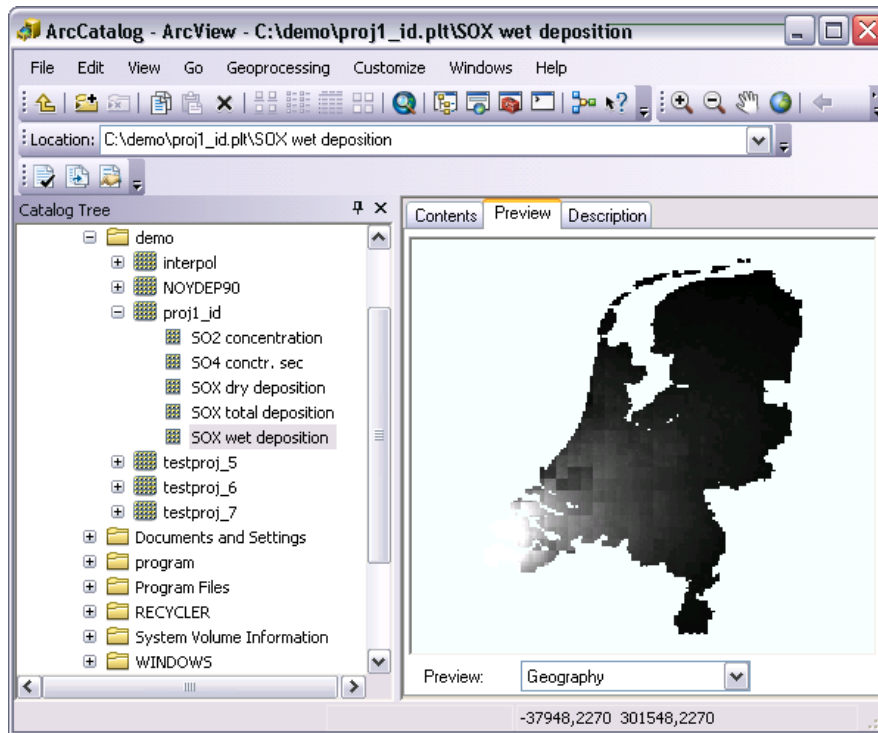


Figure 4-5. Preview of APS grid in ArcCatalog

The meta data will be generated automatically and show information about the used model and attribute specifications in summary and description (Figure 4.6).

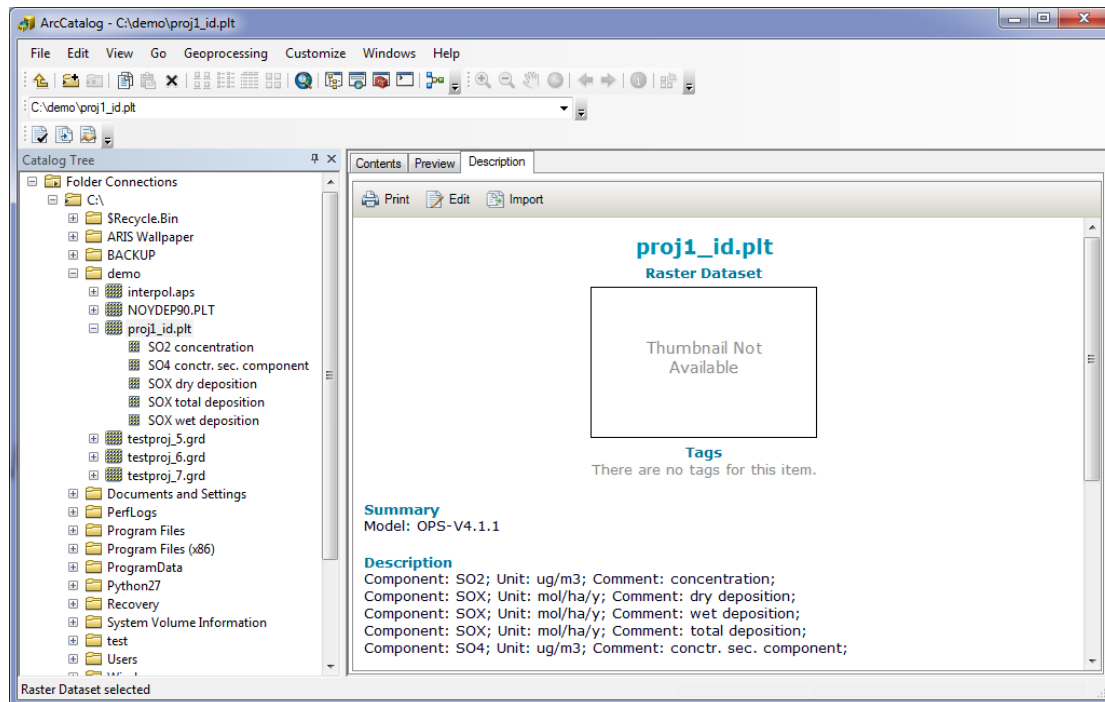


Figure 4-6. Meta data for APS file in ArcCatalog

### 4.3 Spatial Analyst

As soon as an APS file is added to ArcMap, it is available to be used in *Spatial Analyst* tools like *Raster Calculator* and *Neighborhood Analysis*.

In these tools the APS file is selected as a layer in ArcMap:

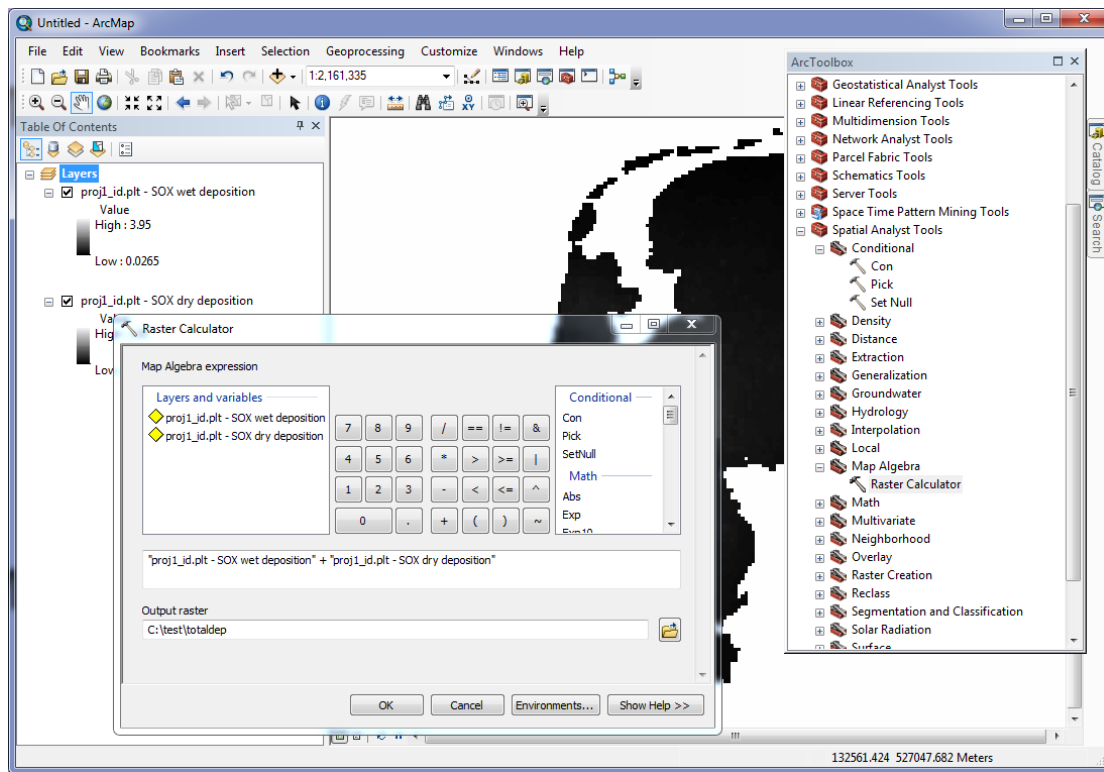


Figure 4-7 Use of direct read APS files in Raster Calculator

Note 1: For the above example a Spatial Analyst license is required and the Spatial Analyst extension must be enabled.

Note 2: APS Reader **does not** require Spatial Analyst for viewing APS files in ArcMap or ArcCatalog.

## 5. Features:

Supported APS Features:

- Non-square cells.
- Multiple rasters in one file.
- All projections stored in the APS file, except Shifted Pole projections, are supported.
- Cell values for integer rasters are represented as 32-bit Integer values, floating-point rasters as 32-bit Single values.

Extended features:

- Storage of header values in ArcGIS metadata format.
- The APS Reader uses the value of the upper-left cell for NODATA, if it is a negative value.

## 6. FAQ

- Q: I installed the APS Reader, but ArcMap and ArcCatalog still don't see APS rasters.
- A: There can be several reasons for ArcGIS not to recognize APS rasters, some of which are:
- Something went wrong during the installation. You can try to run ArcMap or ArcCatalog as administrator once, open at least one raster file, then try again from your ordinary user account. Or do a reinstall as administrator. If it still doesn't work, contact us at [helpdesk@aris.nl](mailto:helpdesk@aris.nl).
- Q: Some APS rasters work, others don't, why is that?
- A: The APS Reader currently only recognizes files that have a file extension \*.aps, \*.grd or \*.plt. If your files are called, say, myraster.ras, or any other file extension, you have no option other than renaming it.
- A: Possibly your APS raster is not in the correct format, see chapter 9 to check if your file complies with the APS Format.
- Q: Does the APS Reader work with ArcGIS 9?
- A: APS Reader version 2.3 only works with ArcGIS 10.1. You will need APS Reader version 1.0.2a for ArcGIS 9.2 and 9.3.
- Q: Does the APS Reader work with ArcGIS 10.0 / 10.1 / 10.2?
- A: APS Reader version 2.3 only works with ArcGIS 10.3. You will need APS Reader version 2.0 for ArcGIS 10.0 and 2.2 for ArcGIS 10.1/10.2.
- Q: Does the APS Reader work with newer versions of ArcGIS?
- A: APS Reader version 2.2 only works with ArcGIS 10.3. You will need a newer APS Reader version if available for higher ArcGIS versions.
- Q: ArcCatalog returns an error or I do not see the right meta data.
- A: Be sure to remove old .XML files created by earlier versions of APS Reader or ArcGIS. The XML file might contain obsolete data. As soon as you view the APS file in ArcMap or ArcCatalog a new XML file is generated and filled by APS Reader and ArcGIS.

## 7. Know problems

### ***Registration***

After registering the APS Reader for a permanent license it could occur that you have to enter your registration name and code every time you start up ArcGIS. Be sure to register the tool as an administrator. Note: Having administrator-privileges may not be sufficient.

### ***Double click in ArcMap Catalog window***

When in trial mode or when the trial period has ended, a double click on an APS Grid in the ArcMap Catalog window may result in unexpected behavior, like an OK button not becoming enabled or ArcMap closing the complete application.

When a valid license of APS Reader is available this problem does not occur.

This problem seems to be solved in APS Reader 2.2

## 8. History

This is the version history for the ARIS APS grid reader. The version number can be found by locating the file *aps.dll*, in a default ArcGIS installation this file should be in the folder *C:\Program Files\ArcGIS\Desktop10.3\Bin\gdalplugins*. Right click on this file and choose *Properties*. The *Version* tab contains version information.

Version	Features
1.0.1	First release
1.0.2	ArcGIS does not crash anymore when removing APS grids
1.0.2a	Setup has changed to be used for ArcGIS 9.2
2.0.0	Projection parameters in ini-file changed to "Meter" for the EMEP projections to be able to work with ArcGIS 10.0. Program and setup changed for compatibility with ArcGIS 10.0.
2.0.1	Minor bug fix.
2.0.2	Better check on valid ArcGIS versions in setup.
2.1.0	Program and setup changed for compatibility with ArcGIS 10.1
2.1.1	Bug fix for half cell shift to upper left
2.2.0	Program and setup changed for compatibility with ArcGIS 10.2 Also works for ArcGIS 10.1
2.2.1	Program and setup changed for compatibility with ArcGIS 10.2.1 Also works for 10.1 and 10.2
2.3.0	Program and setup changed for compatibility with ArcGIS 10.3 and 10.3.1 Adjusted writing meta data for ArcGIS 10.3 Meta data is written as generic meta data, so the metadata format is removed from APS ini file

## 9. The APS Format

The APS raster is a matrix (formatted) representing gridcell values. The raster is preceded by a header which describes spatial attributes and details with respect to the actual content of the file.

The fields in the header have the following meaning:

Format	Column	Fieldname	Meaning
i3	1 - 3	Year	Year for which the matrix is valid
i3	4 - 6	Month	Month for which the matrix is valid (0 if not applicable)
i3	7 - 9	Day	Day for which the matrix is valid (0 if not applicable)
i3,1x	10 - 12	Hour	Hour for which the matrix is valid (0 if not applicable)
a10,1x	14 - 23	Comp	Quantity (for example NH4-deposition)
a10,1x	25 - 34	Unit	Units in which the quantity is represented (i.e. Mol/ha/y)
a10,1x	36 - 45	Data source	Data source (often the name and version of the model is used)
a22,1x	47 - 68	Comment	User comment (optional)
a6,1x	70 - 75	Format	Format of the data in the raster (for example F6.1 <sup>1</sup> )
i2,1x	77 - 78	Cordsys	Code for projection / coordinate system (codes 1-7; see below)
f8.3,1x	80 - 87	Xorg	X-coordinaat of the upper-left corner of the upper-left cell of the raster (units depend on the used coordinate system)
f8.3	89 - 96	Yorg	Y-coordinaat of the upper-left corner of the upper-left cell of the raster (units depend on the used coordinate system)
i3	97 - 99	Nx	Number of cells in X-direction
i3,1x	100 - 102	Ny	Number of cells in Y-direction
f8.3,1x	104 - 111	Wx	Cellsize in X direction (units depend on the used coordinate system)
f8.3	113 - 120	Wy	Cellsize in Y direction (units depend on the used coordinate system)

Textfields are left aligned.

### Projection / Coordinate systems:

The following projections / coordinate systems are supported in the APS format:

1. Amersfoort coordinates ( = shifted RDM)
2. Geografical coordinates ( = lat/lon)
3. Shifted pole with equator at 50° NB
4. Shifted pole with equator at 60° NB
5. Stereografical projection according to EMEP
6. Stereografical projection according to IE ( = EMEP/2)
7. Stereografical projection according to OECD ( = EMEP/3)

The following ArcGIS projection strings are used:

#### Amersfoort:

```
PROJCS["RD_New",GEOGCS["GCS_Amersfoort",DATUM["D_Amersfoort",SPHEROID["Bessel_1841",6377397.155,299.1528128]],PRIMEM["Greenwich",0],UNIT["Degree",0.0174532925199432955]],PROJECTION["Double_Stereographic"],PARAMETER["False_Easting",155000],PARAMETER["False_Northing",463000],PARAMETER["Central_Meridian",5.38763888888889],PARAMETER["Scale_Factor",0.9999079],PARAMETER["Latitude_Of_Origin",52.15616055555555],UNIT["Meter",1.0]]
```

#### Lat/lon:

```
GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137,298.257223563]],PRIMEM["Greenwich",0],UNIT["Degree",0.017453292519943295]]
```

#### EMEP:

```
PROJCS["EMEP_150_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",450000.0],PARAMETER["False_Northing",5550000.0],PARAMETER["Central_Meridian",-32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

#### EMEP/2:

<sup>1</sup> This is a format string as used in the Fortran programming language.

```
PROJCS["EMEP_75_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",412500.0],PARAMETER["False_Northing",5512500.0],PARAMETER["Central_Meridian",-32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

#### EMEP/3:

```
PROJCS["EMEP_50_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",400000.0],PARAMETER["False_Northing",5500000.0],PARAMETER["Central_Meridian",-32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

#### Implicit values:

Two values of measurement are not explicitly mentioned in the APS header. These are the units of the coordinates for the origin and the units that are used for the cellsize of the raster. Both are kilometers for projections 1, decimal degrees for projections 2, 3 and 4, and EMEP/IE/OECD units for projections 5, 6 and 7.

#### Missing value:

The APS format does not support a 'Missing Value'. A workaround that is being used at LLO is to use the value of the upper-left cell as 'Missing Value', if it is a negative value.



## 10. APS Reader configuration

This is a sample configuration file for the APS Reader, containing a number of projection definitions. Projection definitions should be inserted after the [coordsys] section, the key name should be equal to the APS projection ID, and the key value should be an ArcGIS projection string. The projection string must be on one line.

The configuration file can be opened by clicking on *Start | Programs | ARIS | APS Reader | Edit Configuration File*.

```
[coordsys]
1=PROJCS["RD_New",GEOGCS["GCS_Amersfoort",DATUM["D_Amersfoort",SPHERO
ID["Bessel_1841",6377397.155,299.1528128]],PRIMEM["Greenwich",0]
,UNIT["Degree",0.0174532925199432955]],PROJECTION["Double_Stereo
graphic"],PARAMETER["False_Easting",155000],PARAMETER["False_Nor
thing",463000],PARAMETER["Central_Meridian",5.38763888888889],PA
RAMETER["Scale_Factor",0.9999079],PARAMETER["Latitude_Of_Origin"
,52.15616055555555],UNIT["Meter",1.0]]
2=GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",637813
7,298.257223563]],PRIMEM["Greenwich",0],UNIT["Degree",0.01745329
2519943295]]
5=PROJCS["EMEP_150_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_
Sphere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Gree
nwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereo
graphic_North_Pole"],PARAMETER["False_Easting",450000.0],PARAME
TER["False_Northing",5550000.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
6=PROJCS["EMEP_75_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_S
phere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Green
wich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereo
graphic_North_Pole"],PARAMETER["False_Easting",412500.0],PARAMET
ER["False_Northing",5512500.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
7=PROJCS["EMEP_50_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_S
phere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Green
wich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereo
graphic_North_Pole"],PARAMETER["False_Easting",400000.0],PARAMET
ER["False_Northing",5500000.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
```

## Appendix A. License Agreement

ARIS Software License Agreement for APS Reader for ArcGIS

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